COMMONWEALTH OF AUSTRALIA

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Warning

CHARLES DARWIN UNIVERSITY

Family Name	
Given Names	
Student Number	
Teaching Period	Semester 2, 2015

FINAL EXAMINATION	**DURATION**
ENV206 – Environmental Physiology	Reading Time: **10** minutes Writing Time: **180** minutes

INSTRUCTIONS TO CANDIDATES

Students can write on the sheet of scrap paper (last blank page of examination paper) during the 10 minute reading period.

EXAM CONDITIONS

This is a CLOSED BOOK examination

No calculators are permitted

No handwritten notes are permitted

No dictionaries are permitted

Answer on the supplied examination material/s only

ADDITIONAL AUTHORISED MATERIALS	**EXAMINATION MATERIALS TO BE SUPPLIED**
No additional printed material is permitted	1 x 20 Page Book 1 x 4-Multiple Choice Answer Sheet

THIS EXAMINATION IS PRINTED DOUBLE-SIDED.

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Section A

Short Response Questions

Answer all 6 questions.

Total number of marks for this section: 90

This section should be answered in the Answer Booklet provided.

Marks for each question are indicated.
Suggested time allocation for Section A: 90 minutes.

Question 1

a) Define primary and secondary growth as it applies to growth of a plant.

b) Describe secondary cell wall growth as it applies to cells in a herbaceous plant and give an example of a cell type and a tissue type in which it would occur?

c) Describe the tissue types produced by the apical meristem and the vascular cambium and describe in a sentence each how they contribute to primary and secondary growth.

d) Which of the following cell types would be unlikely to become meristematic and why?
Sclerenchyma, sieve cell, vessel cell, parenchyma cell

(Marks: 15)

Question 2

Light harvesting in photosynthesis is accomplished by Photosystems I and II, discrete structural units embedded in the thylakoid membrane of the chloroplast.

Briefly describe how the two photosystems work together to convert light energy to chemical energy. Use a diagram to illustrate your answer if you wish.

(Marks: 15)

Question 3

Why is the endodermis particularly important for controlling which substances enter the vascular tissue of a plant?

Describe the structure of the cell membrane in the root cells, including the main structural components.

If phosphorus ions were being concentrated inside the cell what structure in the membrane is allowing this to occur and what type of membrane transport process would be occurring?

How does this process increase the movement of phosphorus from the soil to the surface of the root?

(Marks: 15)

Question 4

Describe the light independent reactions of photosynthesis and describe the differences between the biochemical pathways found in C3 and C4 plants.

Why do C4 plants have an advantage under hot conditions with respect to (a) the functioning of Rubisco and (b) water use efficiency?

(Marks: 15)

Question 5

Discuss how phosphorus (P) availability is affected by soil pH and texture? Include in your answer explanation of why is P uptake by the plant is more problematic than nitrate uptake in a clay soil?

How do endomycorrhizae and ectomycorrhizae differ?

Explain why mycorrhizae are so important for P uptake in low P soils in Australia.

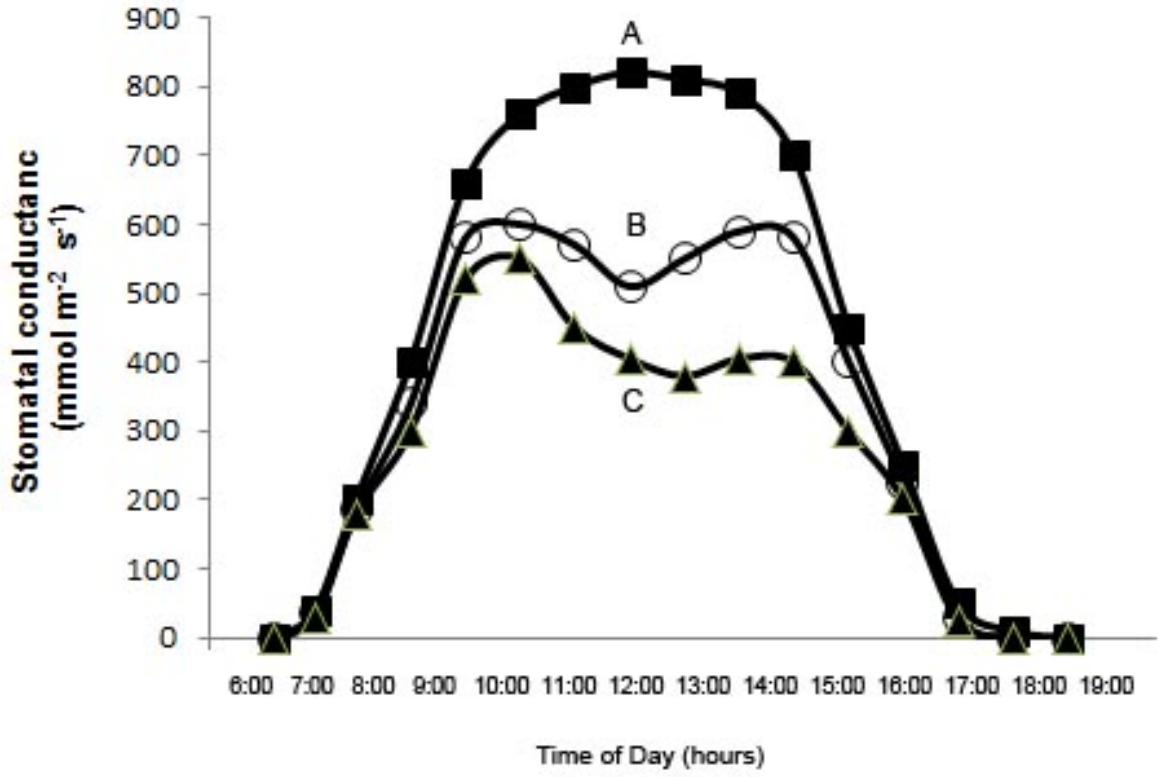
(Marks: 15)

Question 6

a) Stomata are much more than simple holes in the leaf. Describe how stomata open and close in response to changes in environmental conditions.

b) Stomatal conductance (g_s) varies seasonally; briefly describe the differences in g_s between the wet and dry seasons of monsoonal North Australia.

c) The graph below shows the diurnal trend of stomatal conductance under three different soil and vapour pressure deficit (VPD) conditions. Which line best represents g_s in a plant experiencing a high VPD and growing in dry soil close to wilting point?



(Marks: 15)